e-Infrastructures now and in the future

e-IRG Workshop
Budapest, 4 April 2011

Kostas Glinos
European Commission - DG INFSO
Head of Unit, Géant and e-Infrastructures

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The policy perspective

- **ERA and "5th freedom" in Lisbon Treaty**

- **ICT infrastructures for e-Science** (March 2009)

- **EU2020: smart, sustainable and inclusive growth** (March 2010)

  - ➢ Digital Agenda

  - ➢ Innovation Union

  - ➢ Youth on the Move

- **Consultation on next Framework Programme**

  - ➢ CSF, Feb 2011
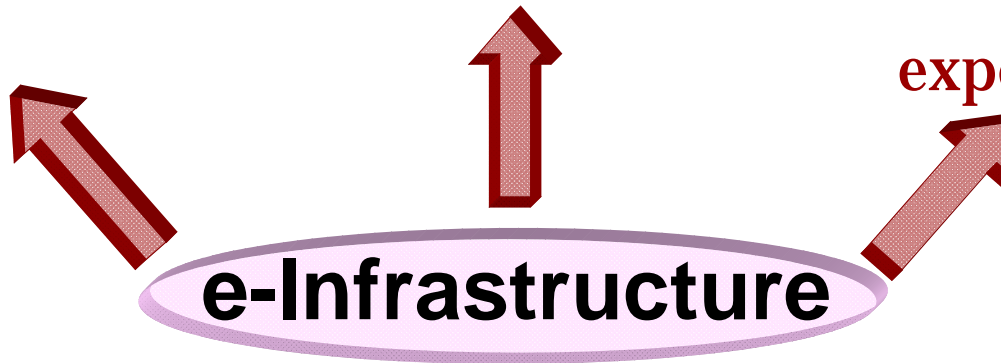
ICT infrastructures for e-Science
COM(2009) 108

Three vectors of a renewed European strategy:

Europe as hub of excellence in **e-Science**

Sustainable and continuous services of production quality 24/7

Innovation by exploiting know-how beyond science (public services, large scale experimentation,...)

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Competitiveness Council Conclusions of 3 December 2009 (1/2)

Member States should (art. 15):

- Coordinate investments in ICT research infrastructures in order to develop research and innovation clusters
  - FI, HPC, green ICT, nano, cognitive, photonics, embedded,…
- Foster trans-national coordination of e-Infrastructures
  - Optimise resources
  - Seamless and safe access for end users

The Commission should (art. 16):

- Propose financial incentives for jointly developing and sharing research infrastructures in ICT
  - E.g. in exa-scale computing

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# Competitiveness Council Conclusions of 3 December 2009 (2/2)

Member States and the Commission should (art. 17):

- **Extend e-Infrastructures** to industrial research and innovation, to public services and SMEs

- Explore **governance models** for efficient, seamless and technologically leading public services

- Examine incentives for **pre-commercial procurement**, including for the deployment of e-Infrastructures

- Better coordinate efforts and develop/share strategies in key areas such as [...] the GEANT network; avoid fragmentation

- **Pool investments** in HPC **under PRACE**
  - ...use, development and manufacturing

- Major research infrastructures to enjoy e-I support

- Broaden **access to scientific data** and open repositories and ensure **coherent approach to data access and curation**
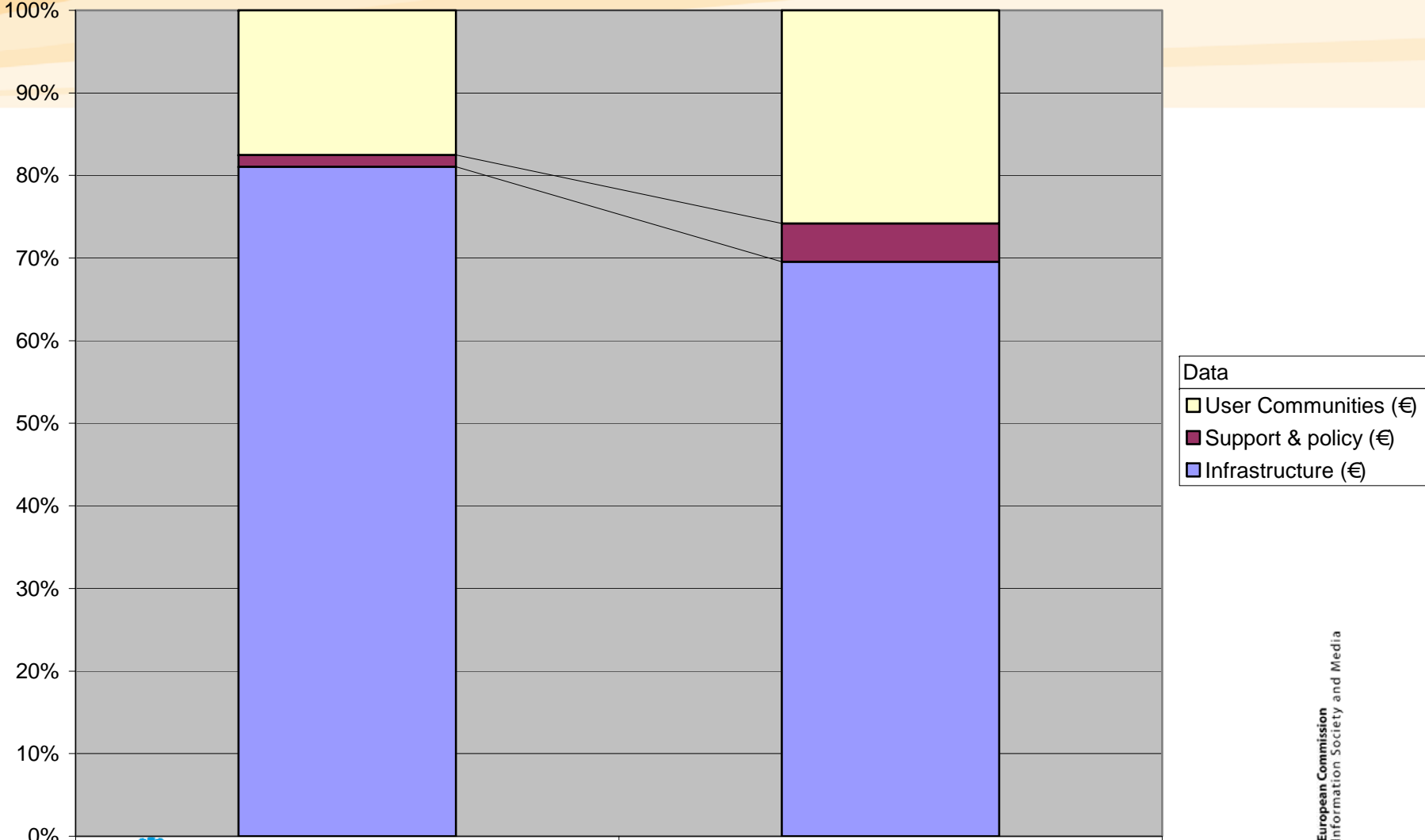
State of Play – 2011

- budget
- data infrastructure
- HPC
- Clouds
- GÉANT Expert Group
- Call 9

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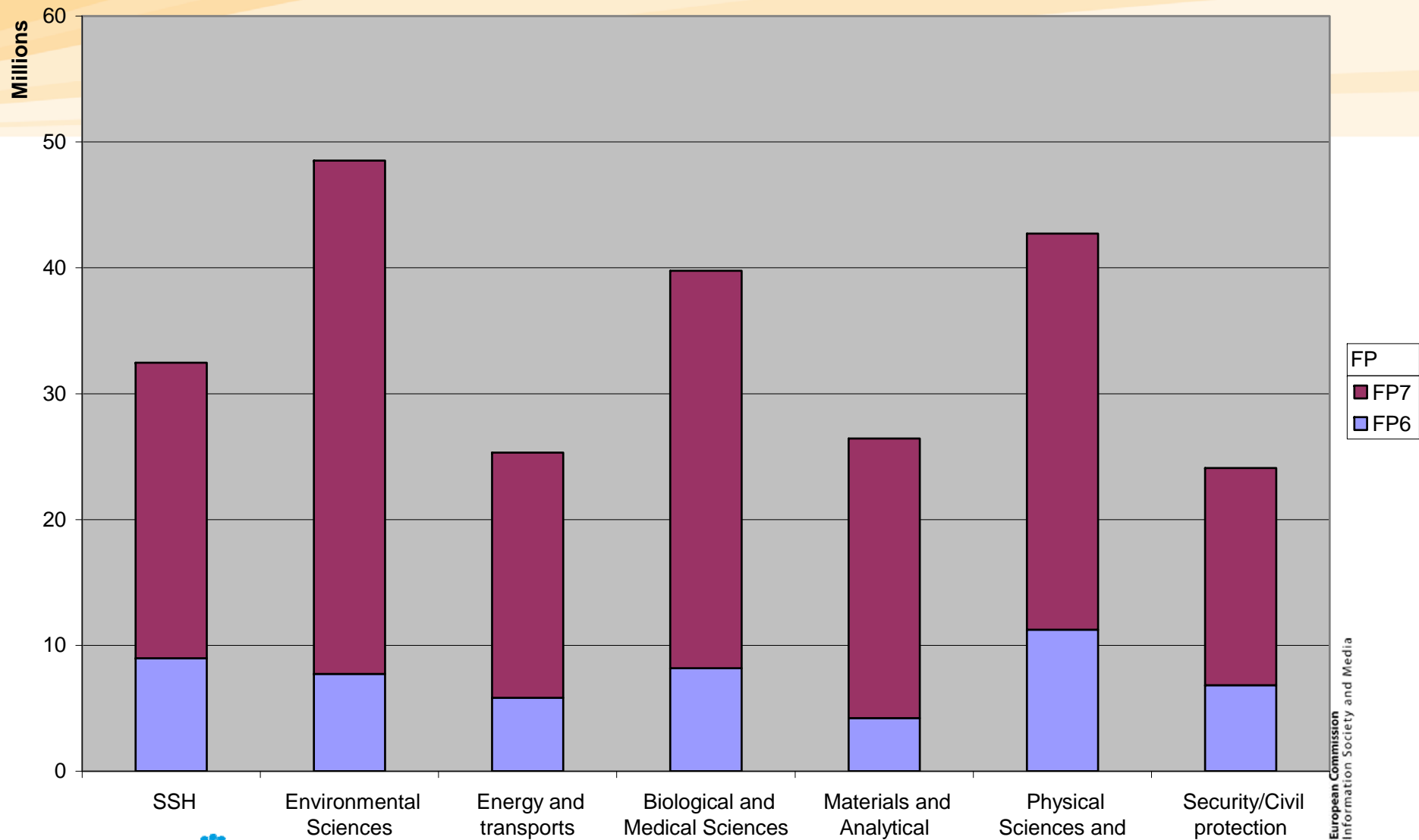
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Support to infrastructure layers 2003 – today (up to Call 7)
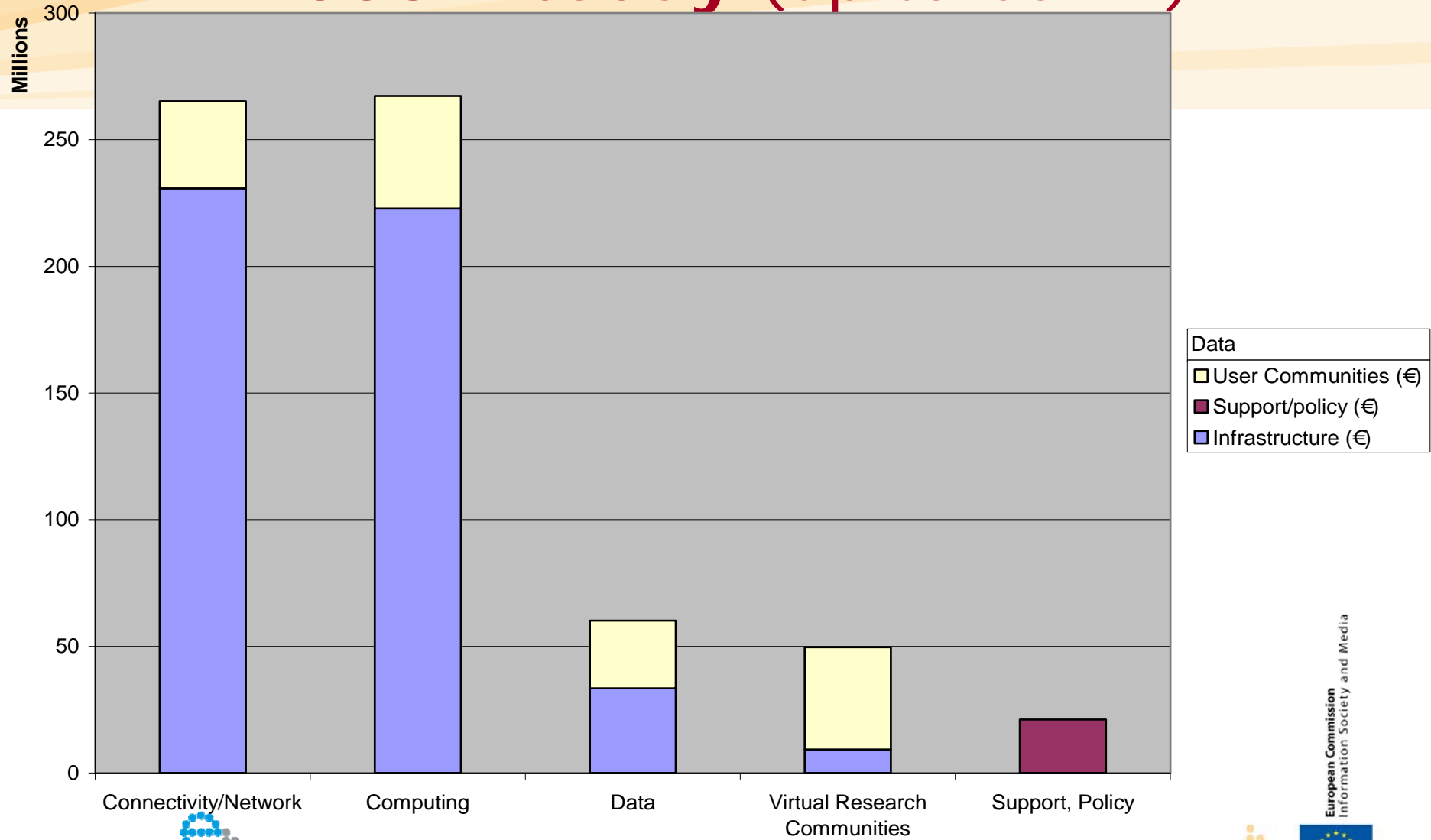
Support to Infrastructure vs support to user communities

Data
- ☐ User Communities (€)
- ■ Support & policy (€)
- ☐ Infrastructure (€)

Main user communities supported

International participation
(funding by AIDCO & RELEX programmes, technical management by INFSO)

Funding provided by AIDCO & RELEX programmess and technical management by e-Infrastructures unit (INFSO)
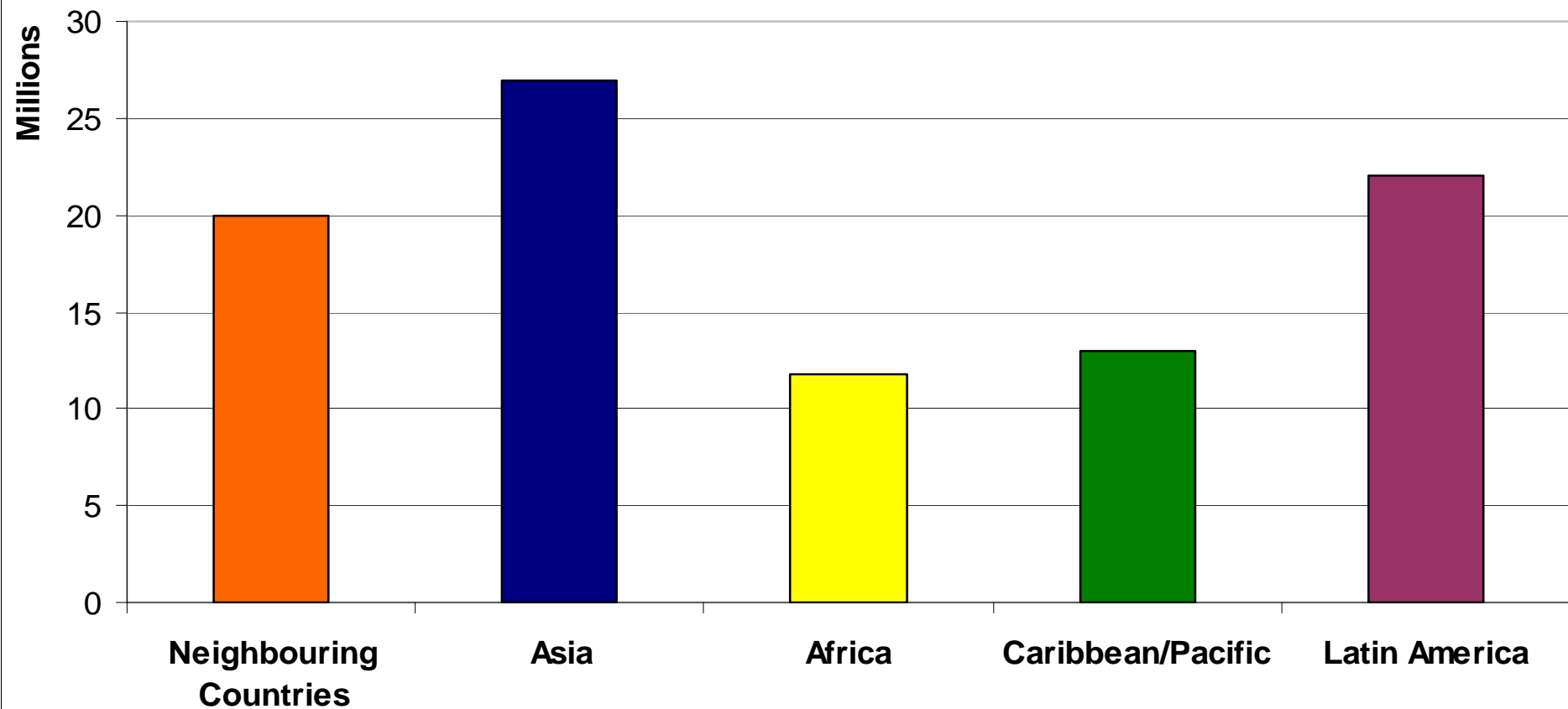
Riding the wave

How Europe can gain from the rising tide of scientific data

Final report of the High Level Expert Group on Scientific Data
A submission to the European Commission

October 2010

"Our vision is a scientific e-infrastructure that supports seamless access, use, re-use, and trust of data. In a sense, the physical and technical infrastructure becomes invisible and the data themselves become the infrastructure – a valuable asset, on which science, technology, the economy and society can advance."

high-level experts group on Scientific Data

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The Collaborative Data Infrastructure - a framework for the future

Trust

Data Curation

Data Generators

Users

User funcionalities, data capture & transfer, virtual research environments

Community Support Services

Data discovery & navigation workflow generation, annotation, interpretability

Common Data Services

Persistant storage, identification, authenticity, workflow execution, mining
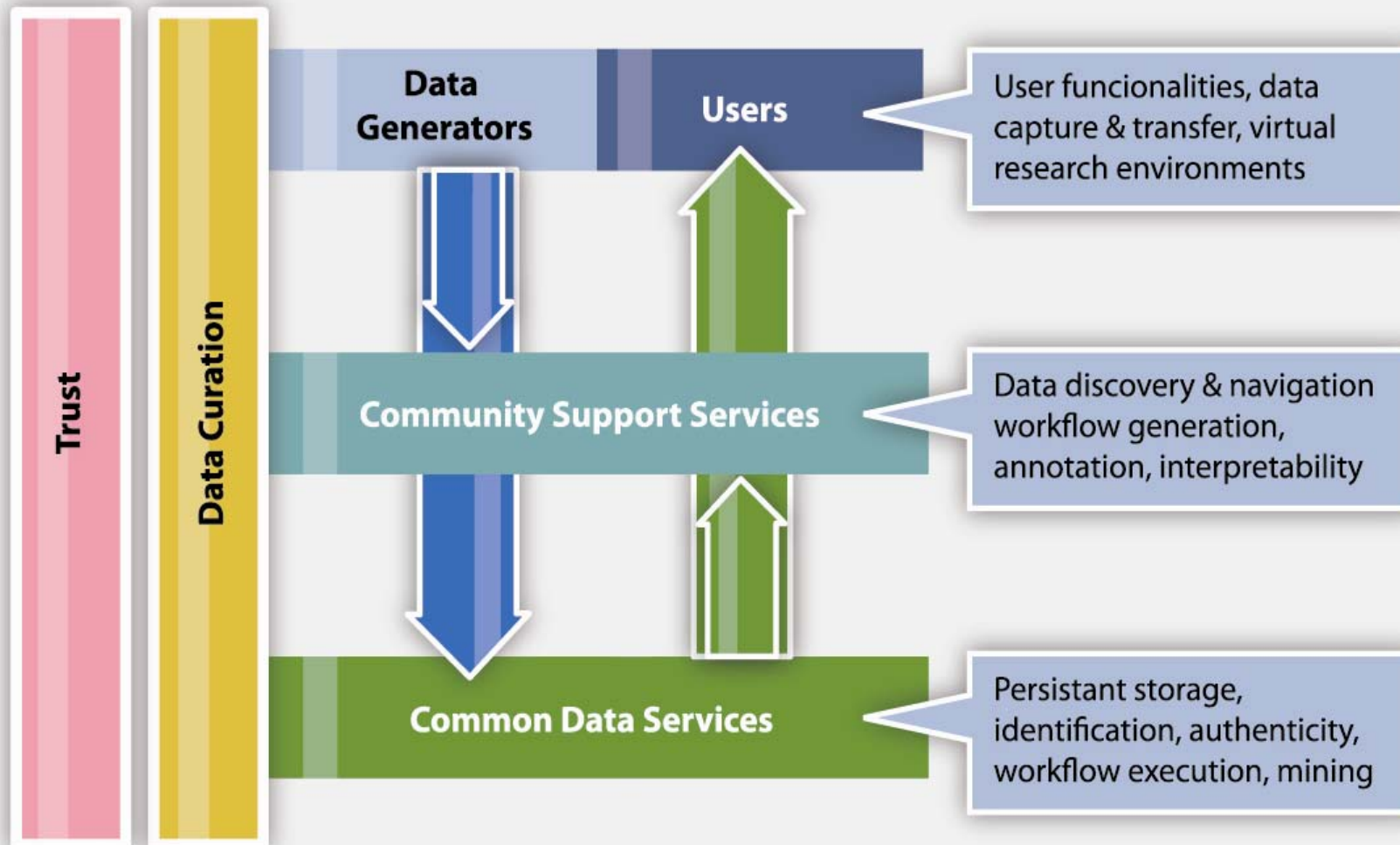
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(Some) ongoing actions on Scientific Data

- OpenAIRE kick-off, Ghent, December 2010
- Call 9 – 45 M€ on deploying scientific data infrastructure
  - in addition to 30 M€ for data infrastructures cutting across ESFRI implementation
- International cooperation
  - US, China, Australia, G8-O5, UNESCO, ...
  - Coordinated Call with NSF in 2011
- Studies – e.g. on DOI
- Communication and recommendation on access to scientific information (by end 2011)
  - EU policy for CSF: papers and data
  - Recommendations to Member States
- Public consultation to be published in April and consultation events
  - Next event on 4 May

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European HPC update

- IDC: Europe lost 10% of its HPC capabilities in the last 2 years while Asia and the US increased by 30% and 40% respectively

- China overtakes Europe (all 27 Member States combined) in terms of HPC capacities available

- Fragmentation of European HPC efforts across countries: PRACE unites efforts at top of pyramid

- Europe has the full value chain of HPC including some system production capabilities; but European IPR often benefitting others

- Very little use of pre-commercial procurement

- Europe strong in application software but lack of structure

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Towards a European HPC Strategy

Basic elements:

- **High ambition**
  - **Europe addressing grand challenges through HPC <u>and</u> winning the exascale race**

- **More investment**

- **Deploying services for industry and SMEs**

- **Ensuring European native capability in systems and software**

- **Linking supply and demand through PCP**

- **Governance**

Communication on HPC in December 2011

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Clouds for Science (1)

Digital Agenda for Europe:

"Ensure sufficient financial support to joint ICT research infrastructures and innovation clusters, develop further eInfrastructures and establish an EU strategy for cloud computing notably for government and science"

<u>Three broad areas</u> of the cloud strategy (presented by VP Neelie Kroes in Davos) :

1. <u>Legal framework:</u> users' rights; data protection and privacy, including the international dimension of cloud computing.
2. <u>Technical and commercial fundamentals:</u> support research and focus on critical issues such as trust & security and availability of cloud services; standardisation and interoperability are very relevant in this context.
3. <u>Market:</u> support to pilot projects aiming at cloud deployment to stimulate demand.

Clouds for Science (2)

Relevant activities:

- eIRG white papers; eInfranet workshop
- VENUS-C and StratusLab as initial deployments to evaluate potential of clouds
- Progressive deployment of clouds and virtualisation technologies in EGI (focus of EGI Technical Forum)
- SIENA European roadmap on grid and cloud standards for eScience and beyond

How will clouds affect existing e-Infrastructures?
How to deploy? What level (Institution/nation/EU/community…)?
What business model? What relation to industry?
How can the "market weight" of e-Science promote European policies?

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Géant Experts Group

- Articulate a 2020 vision and action plan for European Research and Education Networking

- Set up in December 2010; to deliver report to Vice-President Kroes in Automn 2011

- Interviews with stakeholders: Dante, Surfnet, DFN, Bavarian CIO, Terena, Janet, Internet2, CERN, EBI, JIVE, CLAREN, Alcatel-Lucent, Level3, ETNO, Elsevier, Nordunet, e-IRG, …

- Composition:
    - Ziga Turk (Chair)
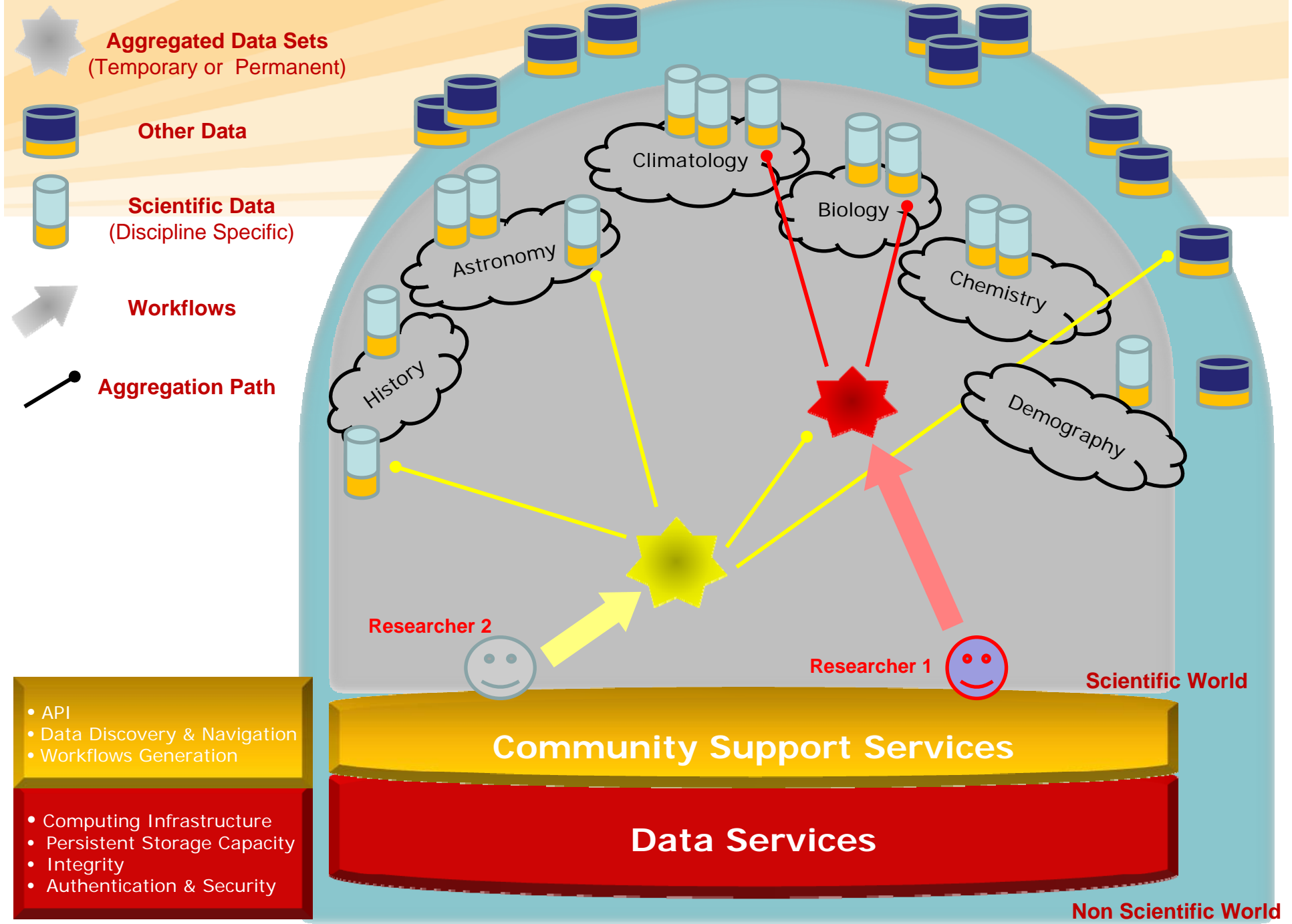   - Arnd Bode, Vassilis Maglaris, Dorte Olesen, Roberto Saracco, Peter Tindemans, Pedro Veiga

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Update on RI Call 9

e-Infrastructures Call9

Call 9: e-Science environments

Scientific areas covered by proposals

- Good number of proposals pursue multidisciplinary activities, even many are focused on specific research areas, covering a wide range of disciplines
    - Earth Sciences (4)
    - Astronomy (3)
    - Spectroscopy (1)
    - Chemistry (1)
    - Bio-sciences (4)
    - Medicine (3)
    - ICT (3)
    - Technology Enablers (6)

Source: High-level Group on Scientific Data

Aggregated Data Sets
(Temporary or Permanent)

Other Data

Scientific Data
(Discipline Specific)

Workflows

Aggregation Path

Climatology

Biology

Astronomy

Chemistry

History

Demography

Researcher 2

Researcher 1

Scientific World

- API
- Data Discovery & Navigation
- Workflows Generation

Community Support Services

- Computing Infrastructure
- Persistent Storage Capacity
- Integrity
- Authentication & Security

Data Services

Non Scientific World

Future perspectives

- Vision: e-Infrastructure as a service to get "every researcher digital"
- e-Infrastructures in CSF: what, for whom and how much
- Communications on HPC and on Access to Scientific Information
- Questions on
  - Services to industry, education, citizens, public sector,…
  - Cloud computing
  - Relation between ICT innovation and e-Infrastructure deployment
  - Governance and financial models
- International dimension important

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Additional slides

e-Infrastructures Vision
empower research communities through ubiquitous, trusted and easy access to services for data, computation, communication and collaborative work

physics community biomedics community astronomy community

Sharing and federating scientific data

Sharing computers, software and instruments

Linking at the speed of the light

. . . .

Scientific facilities, research communities

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European Information